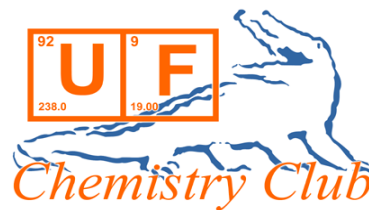


# University of Florida Chemistry Outreach Program

## Capillary Action in Plants

*Estimated time:* 50 mins. + 10 mins. clean-up



**Topics:** Capillary action, Properties of water, Logging qualitative observations, SC.G.1.3

**Introduction:** Capillary action is important for moving water (and all things dissolved in it) around.

It is defined as the movement of water within the spaces of a porous material due to the forces of adhesion, cohesion, and surface tension. Capillary action occurs because water is sticky -- water molecules stick to each other and to other substances, such as glass, cloth, organic tissues, and soil. Dip a paper towel into a glass of water and the water will "climb" onto the paper towel. In fact, it will keep going up the towel until the pull of gravity is too much for it to overcome. Plants use capillary action to absorb water and nutrients from the ground and pull it up their stalks. They can then distribute this water throughout the plant.

**Objective:** This lab is designed to teach the concept of capillary action. Capillary action occurs when the water molecules are more attract to the surface than to themselves. In the experiment, the students will get to see water climb up narrow glass capillary tubes and also climb through the capillary tubes in celery stalks. The students will also observe the celery stalks and white carnations change color over time. Therefore, the students will be learning about making observations and logging their results as they observe the stalks and flowers over the week.



**Materials:**

-5 celery stalks	-Clear plastic cups
-2 white carnations	-Food coloring
-Plastic capillary tubes	-Water source
-5 beakers	-Paper towels
- Vegetable peeler or plastic knife	-Ruler

**Safety:**

- Remind students there is NO eating or drinking during the lab. Even though celery is edible, it is not to be eaten.
- Do not get food coloring on skin or clothes because it may stain.
- Tell students to be extra careful when handling capillary tubes, especially if glass.
- Have a teacher or volunteer cut the celery stalks to avoid children dealing with knives or peelers.
- If any spills occur or glass breaks students should let a teacher know immediately to help with clean up.

### **Procedure:**

1. First briefly discuss properties of water and phenomenon of capillary action in tubes and in relation to plants.
2. Break students into four groups. Give each group a large plastic cup, a celery stalk, some paper towels, and a lot of capillary tubes.
3. Color each groups water: blue, red, purple, and orange
4. Tell students to see cap. Action by putting their tubes into the colored water and seeing how high the water will climb up.
5. Have each group put their celery stalk into the water cup and leave it for 10 mins.
6. Then take out the stalks and peel the edge. Measure how high the water climbed inside the celery.
7. Wrap the celery into the paper towels and note any changes
8. In the front put a flower into 2 glasses of color by splitting the stalk. Also, put celery stalk into water and leave both over the week. Children make observations daily.

**Discussion:**

1. How high did the water climb in their tubes?
2. What happened to the celery stalks in the colored water?
3. What occurred when the celery was wrapped in paper towels? Did the towels change? Which has better capillary action, celery or towels?
4. What do the students predict will happen to the celery and flowers over the next week? Record their hypotheses and make them write their down individually.
5. Who knows what scientists do to remember what they see in experiments?



You can discuss the concept of capillary action applicable to this experiment. Let the class know water rises because it attracts to the surface of the capillary tubes. A lot of water is in contact with the edges of the tube because it is so narrow. The plants depend on capillary action because they absorb water and nutrients from the ground and distribute it through the plant via capillary tubes. The next week discuss the daily changes in the celery and the flower. See which plant absorbed more color and in what patterns the color was absorbed. The celery has a lot of capillary tubes in the stalk, so its water uptake is greater. When celery is wrapped in paper towels, the towels absorb some of the water because it is attracted to the paper fibers. This causes some water to leave the stalks and weaken their colors. The celery's stalks have way more capillary tubes, so the water is held in the plant fairly well.